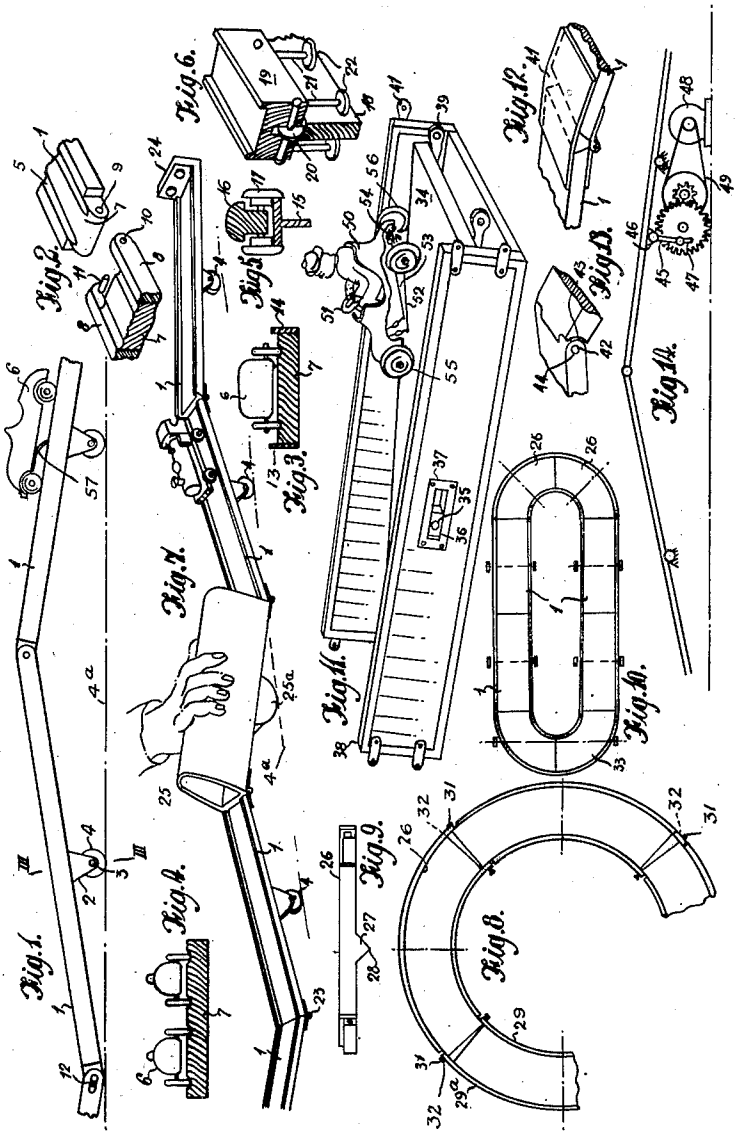
Oct. 13, 1953 J. P. GOWLAND 2,655,116

TILTING TRACK AMUSEMENT APPARATUS

Filed June 2, 1949



Inventor
John P. Gowland
By
Emery, Holcombe & Blair
Attorneys.

Patented Oct. 13, 1953

2,655,116

UNITED STATES PATENT OFFICE

2,655,116

TILTING TRACK AMUSEMENT APPARATUS

John Pinkney Gowland, Santa Barbara, Calif.

Application June 2, 1949, Serial No. 96,741
In Great Britain June 2, 1948

9 Claims. (Cl. 104—58)

1

This invention provides amusement apparatus employing vehicles or other movable elements and a tilting track for these. It is an object of the invention to provide an improved tilting track for such apparatus, which embodies means by which the vehicles may be moved in a step-by-step manner over a number of consecutive track sections. In one application of the invention, the apparatus may be constructed as a toy. In another application of the invention, the apparatus may be constructed on a scale for carrying passengers.

Amusement apparatus according to the invention comprises a track having a series of sections hinged together end to end and each pivotable on a horizontal fulcrum between its ends (preferably about the middle of its length) so that the track sections are simultaneously tiltable up and down in see-saw fashion on their pivots, and when so tilted, each two adjacent sections are oppositely inclined. The track may consist of straight and/or curved sections forming a track layout having in plan view any desired configuration which may be endless (e. g., circular) or not. In order to avoid complicated constructions, the two ends of each section are preferably parallel to each other, and to the tilting axis of the section even when the section is curved for the whole or part of its length.

When its sections are tilted, the track provides a succession of oppositely inclined planes, constituted by the track sections, so that a vehicle placed on the elevated end of one inclined section may run down that section under gravity and be carried by its momentum over the hinge connection and on to the depressed end of the oppositely inclined next section, or past a dead centre and on to a rising portion of the same section, along which the vehicle may climb for a distance under momentum. By now reversing the inclination of the section supporting the vehicle, thus elevating its previously depressed end, the vehicle on it may now run down that section on to the next section, and so on. The vehicle may in this way be caused to travel from one end to the other of the track in the case of a point-to-point, or around the track in the case of an endless track. By suitable control of the track, the vehicle may also, if desired, be caused to return in the reverse direction along the track.

Apparatus according to the invention may be constructed as toys in various forms. The track of a toy embodying the invention may be provided with a base such as a board or plate on which the sections are pivotally mounted, or the

2

sections may be pivoted to brackets for fixture to a support, for example, a wall, the necessary allowance being made in each case for relative movement of the hinge and/or pivot points of adjacent sections. Alternatively, the track may be arranged merely to rest by its fulcra and alternate hinges upon a supporting surface, such as a table or floor. The track sections may be made in convenient lengths of, for example, one foot. Each section may be made of any suitable material, such as wood, metal or plastic, and may be constructed as an individual unit formed or provided at its ends with hinge parts and between its ends with a suitable depending member or members forming a fulcrum or a mounting for a pivot on which the section can rock. For example, each section may have a depending projection, forming a fulcrum, of triangular section integral with or attached to the track section at its base with its apex lowermost for resting as a kind of knife edge, on a supporting table, floor, or other surface. In order to facilitate relative movement of the fulcra in accordance with the pivotal movement of the sections, the fulcra instead of being constituted by edges of the projections, may be constituted by the axes of supporting wheels rotatably connected to the projections. Instead of constructing the track sections as individual units which are assembled and hinged together, the whole track or a length thereof embracing a number of track sections may be formed in one piece of a sufficiently flexible material, such as a suitable extruded plastic, which is weakened transversely at intervals to form hinges between and integrally connecting the track sections defined between successive weakened zones. Suitable fulcrum elements, for example of triangular section as above mentioned, may be secured to the track sections of the one-piece track or track length thus formed.

As well as having any desired configuration in plan view, the track of a toy embodying the invention may also be constructed in various forms to provide various kinds of track bed on which the toy vehicles may run. For example, the track may be constructed as a monorail, e. g. of strip material on edge, and the toy vehicles may be provided with rollers to run on the rail and with depending guide members which engage the sides of the rail to guide the vehicles along it. In another form, the track may provide a substantially flat bed and may have upstanding flanges or ribs along its sides to form fences for keeping the toy vehicles to the track. The track

bed may be sufficiently wide to accommodate a plurality of the toy vehicles abreast, and may be divided, e. g., by upstanding flanges or ribs, into a plurality of "lanes" to which a plurality of toy vehicles running along the track simultaneously may be respectively segregated, if desired. Such a relatively wide track bed may be utilized for race games. Of course, for that purpose a plurality of individual tracks, one for each player may be provided.

In a toy according to the invention, the tilting of the track sections may be effected manually and all sections may be controlled simultaneously by actuating one of the sections. No special actuating device need be provided, as the operator can control the whole track from one track section by merely raising and lowering one end of that section. If desired, however, an actuating lever or the like, mechanically or otherwise operatively connected with one or more of the track sections, may be provided for manipulation by the operator to actuate the track. In an alternative arrangement, the track may be actuated mechanically by provision of a suitable clockwork or other motor having a driving connection with the track, for instance, to one or more of the hinges for raising and lowering the same or to one or more of the fulcra or pivots for rocking the same. If desired, means, such for example as an inclined leaf-spring in contact with the track, may be provided for preventing backward movement of the vehicles.

Apparatus embodying the invention may also be constructed on a scale to carry persons driving vehicles along the track. For such application of the invention, steerable vehicles or cars are provided to seat one or more persons and fitted with a brake and preferably also with a low geared power or manually operated mechanism for driving the car a short distance so as to enable the driver to move the car under its own power or manually, as the case may be, in the event that it should stop on a hinge during the working of the apparatus. Each car may also have a speed governor. In the operation of the apparatus, the driver of a car may release the brake when his car has been elevated by the tilting of the track section on which the car is resting, so that the car will then run down that section and over the hinge on to the next section which, being oppositely inclined, will bring the car to rest before it has climbed very far, the car being held by its brake in that position until the track section on which the car now stands is elevated so that the car can run down it, upon release of the brake. With proper timing, almost continuous running may be attainable. The track for the cars is preferably endless and may be provided with a flexible sliding cover between adjacent sections to bridge the gap which occurs between the sections when their adjacent ends are at the elevated position. A power mechanism is provided for actuating the track sections, and the drive may be connected to the hinges to impart a vertical push and pull thereto or may be connected to the fulcra or pivots of the sections to impart a rocking motion thereto; for either purpose, a mechanical drive incorporating suitable reciprocating mechanism may be provided.

In order that the invention may be more readily understood, a number of embodiments will now be described with reference to the accompanying drawing, in which:

Fig. 1 is a side elevation of part of a tilting track according to the present invention.

Fig. 2 is a perspective fragmental view showing the connection between two sections of this track.

Fig. 3 is a cross section on the line III—III of Fig. 1.

Fig. 4 is a similar cross section of a tilting section element having two tracks arranged side by side, and

Figs. 5 and 6 are a cross section and a perspective view respectively of two forms of monorail tilting section element with suitable vehicles positioned thereon.

Fig. 7 is a perspective view illustrating a toy tilting railway embodying the invention.

Fig. 8 is a plan view of an endless circular tilting track embodying the invention.

Fig. 9 shows one element of the same track in elevation.

Fig. 10 is a plan view of an endless tilting track embodying the invention and including both straight and curved tilting section elements, different forms of the latter being indicated at the two curved parts of the track.

Fig. 11 is a perspective view of a tilting section element with supporting structure and a vehicle adapted to carry a person or persons on such track.

Figs. 12 and 13 are fractional perspective views illustrating means for avoiding gaps at the hinge points of the track.

Fig. 14 shows diagrammatically a form of drive by which the track may be automatically reciprocated.

Referring to Figs. 1 to 3, each track section may comprise a wooden platform 1, provided at its under side near the middle of its length with a projection 2, which may be provided with a sharp or rounded edge 3 at the lower end thereof, extending transversely of the track, said edge being adapted to rest on a suitable supporting surface to form the fulcrum; preferably, however, the projection is equipped with a pair of coaxial wheels or rollers 4, which are adapted to rest on such surface 4a or a single roller of suitable width, the axis of which serves as the fulcrum about which the section may rock in a see-saw fashion, the wheels or the like at the same time permitting longitudinal movement of the track section. A number of track sections 1, which may each be provided with track grooves 5 for a single vehicle as illustrated in Figs. 2 and 3 or with several pairs of track grooves for a number of vehicles 6 running side by side as illustrated in Fig. 4, are connected end to end by a hinge connection. Fig. 2 illustrates a form of hinge connection which is particularly suitable for toy switch-back tracks made of wood. A platform 1 is built up of a central plank 7 and two lateral beams 8 which are of the same length as the plank 7, but longitudinally displaced relatively to the latter so that at one end the plank 7 projects to form a central hinge element provided with a cross bore 9, while at the other end of the same platform, and similarly at the adjacent end of the next adjoining platform, the two beams 8 project to form the outer hinge members provided with coaxial bores 10 of the same diameter as the bore 9. The two consecutive elements are hingedly connected to each other by passing a pivot pin 11 through the aligned bores 9 and 10. It will be understood from the illustration in Fig. 1 that by depression of the right-hand end of the platform 1 appearing in the middle of the figure, this platform

can be tilted about the axis of the rollers **4**, simultaneously forcing down the left-hand end of the platform **1** next to the right and thereby tilting the latter about its own fulcrum axis, while the platform shown on the left-hand side of the figure is similarly tilted in a position parallel to the position of platform **1** next to the right. Assuming that at the beginning of the operation the vehicle **6** was located at the outer end of the right hand section **1**, this vehicle will now under the action of gravity move down this section and, owing to its momentum, pass over the hinge connection on to the platform **1** of the section element in the centre of the figure. If this platform is now rocked back to its position as illustrated, the vehicle will continue its movement to the left, again being carried on by its momentum so as to pass over the next hinge connection and reach a point on the platform **1** of the section element shown on the left of Figure 1, from where it can be further moved in a similar manner by continued rocking movement of the track. It will be appreciated that during each rocking movement the switch-back track will pass through a position in which all the platforms **1** are horizontal, so that in the latter position, unless longitudinal play is provided in the hinges, the total length of the track is greater than in the position as illustrated. Owing to this effect, and also due to the fact that the axis of the rollers **4** which axis is the fulcrum for the actuated element, is located a certain distance below the platform **1**, the individual section elements in addition to their rocking movement also move longitudinally in relation to the actuated element, a movement which, by means of the rollers **4**, they are adapted to carry out without difficulty, while in the absence of rollers a similar movement can be obtained by sliding of the fulcrum edges over the supporting surface. In order to avoid or reduce such longitudinal movement of the fulcra, the hinge connection between the platforms **1** of the individual section elements of the switch-back track may be arranged to permit relative longitudinal movement of the adjacent platform ends; to this end, the bores **10** in the beams **8** may be replaced by longitudinally extending slots **12** as indicated in the left-hand end of Fig. 1. In order to guide or restrain the vehicles, each section may, for example, be provided with track grooves **5**. Alternatively or in addition, each platform **1** may be provided with upstanding flanges **13**, which may be constituted by the upper portions of flat upstanding side members **14**, which take the place of the beams **8**.

Alternatively the track may be formed as a monorail. Fig. 5 illustrates one form of a monorail track **15** which is substantially of T section, while the vehicles **16** adapted to run thereon may, as illustrated, be provided with flanged wheels **17** the flanges of which co-operate with the outer edges of the track **15**. It will be readily understood that instead of using wheeled vehicles the switch-back track may also be operated with suitable ball or roller elements. In the case of a monorail track such an element may be constituted by a roller flanged at its two ends, thus substantially constituting a combination of two coaxial flanged wheels **17**.

Fig. 6 shows another form of monorail track, formed of wooden planks **18** placed on edge, and the vehicles **19** adapted to run on such a track may have rollers **20** arranged in a central plane of the vehicle and adapted to run on the upper edge of the track **18** and guide members **21** depending from the vehicle on each side and equipped at their lower ends with rollers **22** adapted to engage the side of the track to guide the vehicles along it.

Fig. 7 illustrates a convenient form of toy railway embodying the invention. In this case the platforms **1** of the consecutive track sections are connected at their adjacent ends by ordinary metal hinges **23**, secured to the under side of the platforms. Buffers **24** may be provided at the ends of the track, and the section **25** which is intended to be operated by hand equipped with a cylindrical rocking surface **25***a* while the other sections are supported on rollers **4**. As illustrated, this section **26** is formed as a tunnel which apart from making the appearance of the toy more interesting, also offers the advantage of being convenient to operate by hand as illustrated without interference with the movement of the vehicles over the track. While in the examples so far illustrated the track is substantially straight, the invention also contemplates the provision of curved tracks.

Figs. 8 and 9 show an embodiment in which an endless circular track is provided. Each section **26** of the track forms a quadrant of a circle and is provided at its under side with a projection **27** forming a radial fulcrum edge **28**. The hinge connection between consecutive elements is somewhat similar to that illustrated in Fig. 2, ring elements **29** and **29***a* being substituted for the beams **8**, with the difference however, that while the bore **30** provided in the ring **29** for the passage of the fulcrum pin **31** is substantially circular with a small amount of play, the outer ring element **29***a* has slots **32** for the passage of the pin **31** so that the adjacent ends of consecutive elements **26** are capable of relative angular movement, under simultaneous radial movement of the fulcrum edges **28**, so as to permit in the case of an endless track a rocking movement substantially similar to that described with reference to Fig. 1.

Fig. 10 is a plan view of another form of endless track which contains both straight and curved sections and incorporates, by way of example, the features of Figs. 1 to 3. The latter may either be quadrants **26**, as illustrated at the right-hand end of the figure, or semi-circles **33** as illustrated at the left-hand end of the figure. It should however be understood that there must always be an even total number of elements in an endless track so that, with the use of straight elements of uniform length as illustrated, the two curves of the track must either be each constituted by a single semi-circle element **33** or each be composed of two quadrant elements **36**. The element **33** is pivoted about an axis parallel to its limiting diameter, while the quadrants **26** are each pivoted about radial fulcra as described with reference to Figs. 8 and 9.

It should be observed that the use of semi-circular elements **33**, a vehicle will come to a standstill after passing the central radius of such an element, that is to say, it will continue its movement beyond this point only after the track has been rocked to its other operative position, the operation being thus slightly different from that previously described.

While the embodiments of the invention described up to now are mainly intended for use as small-scale toys, Fig. 11 illustrates an embodiment which is particularly suitable for amusement apparatus for fair grounds and in general larger-scale apparatus in which the vehicles are

adapted to carry drivers and/or passengers. Each section of the track is constituted by a platform 34 of any suitable known construction, which is supported at its middle by a pair of coaxial transverse pins 35, each pin 35 being supported in a journal block 36 adapted to slide horizontally in a suitable guide 37 which, in its turn, is secured in a suitable opening of a wall structure 38, for example of wood. Hinge members 39 are secured on the under side of the platforms 34 at both ends thereof for connecting consecutive platforms 34 by means of suitable bolts, and connecting tabs 40 are provided to connect the wall elements of consecutive track sections. Means are provided for bridging the gaps formed between adjacent platforms 34 of the track in the upper position of each hinge, and for this purpose, flexible rubber mats 41 may be provided to cover the gap at its top position, substantially as shown in Fig. 12. Alternatively, the hinge elements 39 may be so constructed as to provide for hinge movement about an axis passing through the thickness of the platform 34, and one end of each platform 34 may be rounded co-axially with the hinge bore 42 as indicated at 43 in Fig. 13, the adjacent end of the next platform forming a concave socket as shown at 44. The alternating rocking movement of the platforms 34 is effected by power driving means, and for this purpose a link 45 may be interposed between a suitable connecting point 46 (Fig. 14) at the under side of the platform and a crank pin 47 on a driving wheel mounted in a cantilever manner and driven by an electric motor 48 through a combined belt and gear drive 49. Alternatively, the free end of the link 45 may be pivotally connected to a hydraulically, pneumatically, or steam operated piston. Vehicles adapted to run on the track 34 may be in the form of motor cars 50 and preferably are adapted to be controlled by an occupant by means of a steering device 51 of known construction acting upon the front wheels 55 and a brake 52 acting on the rear wheels 56. The provision of the brake 52 avoids the necessity of definite timing of the rocking period of the platforms in relation to the speed of the vehicles, since the occupant of each vehicle is in a position to apply the brake as soon as his vehicle stops moving forwards and before it begins to move backwards, releasing the brake again as soon as the platform on which the vehicle is positioned, begins to assume an inclination in the forward direction. Preferably, a low-geared drive 53, operable manually by the occupant or if desired a low-geared power drive, is provided enabling the occupant to move the vehicle forward for a short distance if for any reason it should come to a stop over one of the hinges. 54 is a speed governor constituting a speed-responsive braking means for limiting the speed of the vehicle. This governor being of customary construction, its mechanism is not shown in detail. The drive 53 may, for example, consist of a pedal lever with a low-geared ratchet drive similar to those commonly employed in children's cars. It should be understood that the embodiments illustrated have been described by way of example, and that various features of different embodiments may be combined to adapt the apparatus to varied requirements. More particularly a motor or clockwork drive may be incorporated in toy-type amusement apparatus according to the invention, in which case preferably the vehicles or the like employed are provided with means restraining them from backwards movement such for example as a suitably inclined, flat drag spring 57 (Fig. 1).

I claim:

1. A length of tilting track comprising at least three substantially rigid track sections hingedly connected end to end for pivotal movement about axes extending crosswise of the track, each section having downwardly projecting fulcrum supporting means for supporting such section tiltably on a horizontal surface, the combination being such as to permit, when the track is placed on a plane horizontal surface with all said supporting means resting thereon, tilting movement between two extreme positions in each of which adjacent sections are inclined in opposite directions, the inclination of each section being oppositely directed in the two said positions respectively.

2. A length of toy-size tilting track as claimed in claim 1, wherein one of said sections comprises a tunnel-like member fixed to the track, said member constituting a hand hold by which the track may be manipulated to tilt the same between said two positions.

3. A length of tilting track, comprising a plurality of section members each comprising an elongated substantially plank-shaped member having grooved guiding track means on its upper side and a supporting fulcrum part projecting downwardly from its lower side, all said section members being of substantially equal length and all said fulcrum parts being of substantially equal height, and pivotal connection means by which said section members are connected end to end to form a continuous length of track.

4. A length of tilting track as claimed in claim 3, wherein one of said sections comprises a tunnel-like member fixed to the track, said tunnel-like member constituting a hand hold for manipulation to tilt said section when supported on a horizontal surface between two positions of opposite longitudinal inclination.

5. A length of tilting track as claimed in claim 3, wherein said pivotal connection means are of a type permitting limited relative movement of the connected ends longitudinally of the track.

6. A length of tilting track as claimed in claim 3, wherein at least one of said supporting fulcrum parts includes a substantially rigid part and roller means projecting downwardly from said rigid part and mounted thereon for rotation about an axis extending transversely of the track.

7. A toy comprising a length of track as claimed in claim 3, a wheeled toy vehicle and automatic holding means in said vehicle constructed to counteract rolling movement of the vehicle in one direction of movement while permitting free movement in the opposite direction, said toy vehicle being suitably dimensioned for rolling along the track.

8. A toy comprising in combination at least three substantially plank-shaped elongated track members each having guiding track means on its upper side, said track members being hingedly connected end to end to form a hinged substantially continuous length of track, a fulcrum supporting member projecting downwardly from each track member near the middle of its length, whereby said track member may be rockably supported on a flat supporting surface, a tunnel-like member fixed to one of the track members to cover the track, said tunnel-like member constituting a hand hold by which the track member may be manipulated to tilt the same between two extreme positions, the fulcrum sup-

port means of the other track members being each equipped with roller means whereby said members may move towards and away from the support means of said one member.

9. A tilting track for amusement apparatus, comprising at least three substantially rigid track sections hingedly connected end to end for pivotal relative movement about axes extending crosswise of the track and pivotal supporting means for supporting said sections while permitting its longitudinal inclination to be varied between two opposite values, the combination being such as to cause the longitudinal inclinations of alternate sections to be opposite at each extreme position of any one section.

JOHN PINKNEY GOWLAND.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,508,905	Vaszin	Sept. 16, 1924